

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 2, 4-26, and 28-30 are pending in the present application, Claims 1, 2, 14-21, and 30 having been amended. Support for the amendments to Claims 1, 2, 14-21, 28, 29, and 30 is found in the specification and no new matter is added.

In the outstanding Official Action, Claim 30 was rejected under 35 U.S.C. §101 as being directed toward non-statutory subject matter; and Claims 1, 2, 4-26, and 28-30 rejected under 35 U.S.C. §103(a) as unpatentable over Linnartz (U.S. Patent No. 5,933,798).

Applicant thanks the Examiner for the courtesy of discussing this application with Applicant's representative. Differences between the present invention and the applied art, and the rejections noted in the outstanding Office Action were discussed. No agreement was reached pending the Examiner's further review when a response is filed.

With respect to the rejection of Claim 30 under 35 U.S.C. §101, Claim 30 is amended as suggested in the outstanding Office Action. Applicant respectfully requests that this ground of rejection be withdrawn.

Initially, it is noted that an Information Disclosure Statement (IDS) is filed herewith. The documents cited in the IDS show that "transform domain" and "inverse transform(ed)" are terms of art. Further, the documents cited in the IDS show that transform coefficients are not spatial coefficients.

In the invention defined by Claim 1, watermark data is inverse transformed from the transform domain into the spatial domain. As will be explained with reference to the documents cited in the IDS, the terms transform domain, inverse transform, and spatial domain have well understood meanings. It will also be explained that inverse transform may be used conventionally to describe transforming image data from the transform domain to the

spatial domain. Additionally, as will also be explained, spatial domain and transform domain are mutually exclusive domains.

Applicant notes that “transform domain” is not so broad as to encompass any domain including spatial domain. In the first paragraph of the “Introduction” section of Wolfgang *et al.* (cited in the IDS), it is stated “Many watermarking schemes have been introduced for digital images; spatial and transform domain techniques being the most common.” This quotation highlights that the person of ordinary skill in the art understands that, firstly the spatial domain and transform domain are not the same and that transform domain is a term of art. Moreover, Wolfgang *et al.* then goes on to identify why these domains are not the same. Specifically, Wolfgang *et al.* states

Spatial techniques generally adjust the lower-order bits of image pixels to guarantee imperceptibility. Spectral or transform techniques incorporate the watermark into the transform coefficients of an image. Popular transforms include the discrete cosine transform (DCT) and the wavelet transform.¹

In other words, when inserting a watermark in the spatial domain, image pixel values are altered, whereas in the transform domain, the transform coefficients of an image are adjusted. This means that the actual mechanism for inserting the watermark is completely different depending on whether one inserts the watermark using the spatial domain or the transform domain. Furthermore, it is apparent from the term “popular,” when referring to DCT or wavelet in the above-noted passage that many different transforms could be used and that transform domain is an umbrella term covering many transforms that use the transform domain mechanism explained above.

In section two of Cheung (also cited in the IDS), it is stated that

There are many data embedding schemes available, some of which are easy to implement and some of which are more complex. Basically, they can be loosely divided into two groups.

¹ Wolfgang *et al.*, page 440, introduction section.

One works in the spatial domain and the other works in the transform (or frequency) domain.

Thus, it is submitted that *Cheung* identifies that the person of ordinary skill in the art appreciates that the spatial domain and transform domain are conventional terms that they would understand. More importantly, *Cheung* also highlights that the spatial domain and the transform domain are mutually exclusive domains.

In the left hand column of *Cheung* on page III-376, it is stated “An inverse DCT step...will yield the image with the required embedded data.” This passage means that “inverse transform” (which in this case relates to the discrete cosine transformation – one of many types of transform domain mechanisms as per *Wolfgang*) has a conventional meaning that generally describes the process of transforming the transform domain representation into the spatial domain. As noted previously in *Wolfgang*, as well as in *Cheung*, these are two mutually exclusive domains.

Thus, it is not correct that i) “transform domain” also includes “spatial domain,” and ii) “inverse transform” means any change.

It is well established that while the PTO is to give claim language its broadest “reasonable” interpretation, this does not mean that the PTO can completely ignore the understanding that the artisan would have of the term “format” obtained in light of the specification so as to ascribe a completely different and unknown meaning to “transform domain” and “inverse transform.” See *In re Cortright*, 165 F.3d 1353, 1358, 49 USPQ 2d 1464, 1467 (Fed. Cir. 1999). (“Although the PTO must give claims their broadest reasonable interpretation, this interpretation must be consistent with the one those skilled in the art would reach.”) and *In re Okuzawa*, 537 F.2d 545, 548, 190 USPQ 464, 466 (CCPA 1976) citing *In re Royka*, 490 F.2d 981, 984, 180 USPQ 580, 582-83 (CCPA 1974) (“Claims are not to be read in a vacuum, and while it is true they are given the broadest *reasonable*

interpretation during prosecution, their terms still have to be given the meaning called for by the specification of which they form a part.”).

In *Liang et al.* (“A modified robust embedding scheme for faithful watermark extraction,” hereinafter *Liang I*), it is noted, in the section headed “Problem with Conventional Embedding Scheme,” that

In transform-domain private methods, the original image is first transformed to the selected domain, and then a randomly generated watermark is superimposed by modifying the transform coefficients in a customised manner. The watermark image results from an inverse transform of the modified from an inverse transform of the modified coefficients. The discrete cosine transformation (DCT) and the discrete wavelet transform are the two most commonly used image transforms.

In *Liang et al.* (“Improved Watermark Robustness Via Spectrum Equalization,” hereinafter *Liang II*), it is noted in section 2 (left hand column of page 1952) that

In transform-domain methods, the to-be-watermarked image is first transformed to the desired domain. Then the watermark signal is superimposed by modifying the transform coefficients through the underlying embedded algorithm. The watermarked image is obtained by an inverse transform of the modified spectrum.

In other words, the coefficients of the transform domain representation of the original image are modified in a particular way. This results in the transform domain representation of the watermarked image. The watermarked image, i.e., in the spatial domain, is then generated by inverse transforming the modified spectrum. Accordingly, this highlights that the term “inverse transform” is a term of art and is used to describe the process that occurs when an image in the transform domain is transformed into the spatial domain. This is also noted on page 5, lines 11-12 of the originally filed specification.

The IDS also cites a document by *Caramma* entitled “A Blind and Reliable Watermarking Technique for Colour Images,” which highlights that wavelet transforms are merely one type of transform amongst others.

From the above-noted discussion, it is submitted that the terms “transform domain” and “inverse transform domain” are conventional. Additionally, it is submitted that the spatial domain and transform domain are mutually exclusive. Thus, the “transform domain” does not cover the “spatial domain.” Moreover, it has been highlighted that the term “inverse transform” is used to describe the process of transforming an image from the transform domain into the spatial domain. This is far more than mere filtering (as in Linnartz) and has a specific technical meaning.

With respect to the rejection of Claim 1 as unpatentable over Linnartz, Applicant respectfully submits that the amendment to Claim 1 overcomes this ground of rejection. Claim 1 is amended to more clearly describe and distinctly claim the subject matter regarded by Applicant as the invention. Amended Claim 1 recites

An apparatus comprising:

an inverse transformer configured to perform an inverse transformation of watermark data from a transform domain into watermark data in a spatial domain, wherein said transform domain is a domain other than the spatial domain, the transform domain watermark data comprising a plurality of transform domain coefficients and the spatial domain watermark data comprising a plurality of spatial domain pixels which represent the watermark data in the spatial domain; and

a combiner configured to receive material into which no watermark data has been embedded, the material being in the spatial domain, the material comprising a plurality of spatial domain pixels, and to combine the pixels of said spatial domain watermark data with the spatial domain pixels of said material in the spatial domain to form watermark data embedded material.

Linnartz does not disclose or suggest every element of amended Claim 1.

The outstanding Office Action takes the position that filtering in the spatial domain is the same as inverse transforming into the spatial domain. However, as explained above, a person of ordinary skill in the art would not equate filtering to an inverse transformation. Moreover, the present amendment to Claim 1 clarifies that the invention defined by Claim 1 starts from the transform domain, which is a domain other than the spatial domain, and transforms the data into the spatial domain. In other words, the invention defined by Claim 1 goes from one domain and moves into another domain rather than filtering in a particular domain.

Furthermore, the statement in Linnartz that “Other examples are combinations of a transform, a prediction for each frequency subband or transform coefficient, and inverse transform” does not disclose or suggest the claimed “inverse transformer.” Applicant respectfully submits that it is not reasonable to interpret Linnartz as suggesting that the predictive filter receives the watermarked data $W_j(n)$ in the transform domain, that the predictive filter transforms it internally into the spatial domain, then outputs the filtered watermark data $W'_j(n)$ in the transform domain. As explained in col. 2, line 10 of Linnartz, the predictive filtering is carried out in the spatial domain. Col. 4, lines 40-50 merely provides examples of linear predictive filters (i.e., the passage states “Other examples [of predictive filters are combinations of a transform, a prediction for each frequency sub-band or transform, and an inverse transform.”]). Col. 4, lines 40-50 does not describe or suggest that a predictive filter will receive the watermark data, transform it, and then transform it back to the original domain.

Furthermore, based on the above-noted understanding a person of ordinary skill in the art would have regarding the claim language, a person of ordinary skill in the art would realize that filter 26 in Linnartz does not perform inverse transformation of transform domain

watermark data into spatial domain watermark data. All that is described in Linnartz is to filter data in the spatial domain.

Amended Claim 1 also recites, *inter alia*, “a combiner configured to receive material into which no watermark data has been embedded, the material being in the spatial domain, the material comprising a plurality of spatial domain pixels, and to combine the pixels of said spatial domain watermark data with the spatial domain pixels of said material in the spatial domain to form watermark data embedded material.” Linnartz does not disclose or suggest this element of amended Claim 1.

In Linnartz, the material $x_i(n)$ does not have the watermark data embedded into it by summation circuit 23 or multiplier 22. The material $x_i(n)$ already is watermark encoded data. The material $x_i(n)$ is for comparison purposes only. This is because Fig. 3 of Linnartz relates to a watermark decoder, and not a watermark encoder. As noted in col. 3, line 36 of Linnartz, the $x_i(n)$ data is material with the watermark data to be detected. In other words, the $x_i(n)$ material is encoded with a watermark prior to being processed by summation circuit 23 or multiplier 22.

Summation circuit 23 outputs a comparison signal that represents the amount of correlation between $x_i(n)$ (watermark encoded data) and $w_j(n)$ (the watermark signal).² This is done to determine which watermark was previously encoded into the $x_i(n)$ data. The watermark signal with the greatest amount of correlation is assumed to be the watermark in the $x_i(n)$ data.³

Thus, summation circuit 23 of Linnartz does not receive material into which no watermark data has been embedded, and does not combine the pixels of watermark data with the received material (in which no watermark data has been embedded) to form watermark data embedded material.

² Linnartz, col. 3, lines 59-61.

³ Linnartz, col. 3, lines 62-65.

In view of the above-noted distinctions, Applicant respectfully submits that Claim 1 (and Claims 2, 4-20, and 31) patentably distinguish over Linnartz. In addition, Applicant respectfully submits that amended Claim 21 is similar to amended Claim 1. Accordingly, Applicant respectfully submits that amended Claim 21 (and Claims 22-26 and 28-30) patentably distinguish over Linnartz, for at least the reasons stated for Claim 1.

With respect to the use of Official Notice in the outstanding Office Action, Applicant notes that Official Notice may be taken for facts outside of the record which are capable of instant and unquestionable demonstration as being "well-known" in the art. *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970). As set forth in MPEP § 2144.03, if an Applicant traverses an assertion made by an Examiner while taking Official Notice, the Examiner should cite a reference in support of their assertion.


In addition, Applicant respectfully traverses those grounds for rejection relying of Official Notice. Applicant does not consider the features for which Official Notice were taken to be "of such notorious character that official notice can be taken." Therefore Applicant traverses this assertion. "The examiner should cite a reference in support of his or her position."⁴

⁴MPEP 2144.03, page 2100-129, left column, second full paragraph of MPEP 2144.03.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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